

ABSTRACT OF THE DISCLOSURE

A membrane-electrode structure capable of exhibiting excellent electric power generation performance even in a high current region and a polymer electrolyte fuel cell using the membrane-electrode structure are provided. Additionally, electric appliances and transport machines each using the above-described polymer electrolyte fuel cell are provided. The membrane-electrode structure comprises an anode electrode 2a, a cathode electrode 2b and a polymer electrolyte membrane 3 made of a sulfonated polyarylene based polymer and held between both electrodes 2a, 2b. The cathode electrode 2b comprises an electrode catalyst layer 4b containing a catalyst particle having the catalyst loaded on the carbon particles, a pore forming member and an ion conducting polymer falling within the weight ratio range from 1.0 to 1.8 in relation to said carbon particles, and is in contact with the polymer electrolyte membrane 3 through the electrode catalyst layer 4b. The electrode catalyst layer 4b has a total sum volume of the pores falling within the pore diameter range from 0.01 to 30 μm , of the pores formed by the pore forming member, equal to or more than 6.0 $\mu\text{l}/\text{cm}^2\cdot\text{mg}$ catalyst. The pores formed by said pore forming member have a first peak falling within the pore diameter range from 0.01 to 0.1 μm and a second peak falling within the pore diameter range from 0.1 to 1.0 μm .